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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/534,158	BONTUS ET AL.
	Examiner	Art Unit
	John M. Corbett	2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 12 July 2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 05 May 2005 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. The indicated allowability of claim 3 is withdrawn in view of the newly found references Turbell et al. ("An improved PI-method for reconstruction for helical cone-beam projections", 24-30 October 1999, Nuclear Science Symposium, 1999, IEEE, pages 865-868), Katsevich (6,574,299) and Zeng et al. (5,559,335). Rejections based on the newly cited references follow.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: K planes 51. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The specification is objected to because of the following informalities, which appear to be minor draft errors.

On page 6, in equation 3, " $s \leq s_2 \leq 2 + 2\pi$ " is disclosed. Perhaps " $s \leq s_2 \leq s + 2\pi$ " was meant.

On page 7, line 9, " $y(s),\ y(s, s_2)y(s_2)$ " is disclosed. Perhaps " $y(s),\ y(s, s_2), y(s_2)$ " was meant.

Claim Objections

4. Claim 16 is objected to because of the following informalities, which appear to be minor draft errors including grammatical and/or lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following correction(s) may obviate the objection(s):

Claim 16, line 1, "The method of claim 16" was claimed; perhaps --The method of claim 15-- was meant.

Appropriate correction is required.

Note: For examination purposes, claim 16 is taken to be dependent on claim 15.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 13-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 13, the claim fails to define the variables λ, ε, R and x. The claim further fails to define the functions $s(\varphi)$, $y(s)$ and $\Phi(s,x)$. The claim therefore is indefinite.

With respect to claim 14, the claim fails to define the variable x. The claim further fails to define the functions $s(\varphi)$, $y(s)$ and $\Phi(s,x)$. The claim therefore is indefinite.

For examination purposes, the Examiner has taken the position that the following definitions apply:

λ is the cone angle of the radiation beam;

ε is the fan angle of the radiation beam;

R is the radius of the helical trajectory;

x is a location in the examination zone;

$s(\varphi)$ is a parameter that is a function of φ;

$y(s)$ is a function that indicates the radiation source position along a helical trajectory and is dependent upon the parameter s; and

$\Phi(s,x)$ is a unity factor which points from the radiation source position $y(s)$ in the direction of x.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claim 6 is rejected under 35 U.S.C. 102(b) as being anticipated by Turbell et al. ("An improved PI-method for reconstruction for helical cone-beam projections", 24-30 October 1999, Nuclear Science Symposium, 1999, IEEE, pages 865-868).

With respect to claim 6, Turbell et al. teaches a method, comprising:

producing measuring values indicative of radiation that traverses an examination zone and is detected by a radiation sensitive detector (Figure 1); and

reconstructing the measuring values as a function of corresponding projection angles to generate an image indicative of the examination zone (Step 4 of introduction and Figures 6-8).

7. Claims 6-11 and 15-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Katsevich (6,574,299).

With respect to claim 6, Katsevich teaches a method, comprising:

producing measuring values ($D_f(y,\Theta)$) indicative of radiation that traverses an examination zone and is detected by a radiation sensitive detector (Figure 1); and

reconstructing the measuring values as a function of corresponding projection angles to generate an image indicative of the examination zone (Col. 1, lines 5-9).

With respect to claim 7, Katsevich further teaches wherein a projection angle (parameter s) is the angle enclosed by a PI line (Col. 5, lines 36-44 and Figure 4) of an object point (x) projected in a plane perpendicular to an axis of rotation (Equation 1 for y_1 and y_2).

With respect to claim 8, Katsevich further teaches

determining a partial derivative (Step 35) of the measuring values;

performing a weighted-integration of the partial derivative (Equations 10 and 12, $1/\sin\gamma$ term and equation 10, $1/|x-y(s)|$ term); and

reconstructing the integrated partial derivative to generate the image (Step 50 and items 4 and 6).

With respect to claim 9, Katsevich further teaches wherein the partial derivative is integrated (Equation 10) along K lines (Col. 7. lines 5-11).

Note: K plane corresponds to Π plane. K lines correspond to family of lines.

With respect to claim 10, Katsevich further teaches wherein performing the weighted-integrating the partial derivative of the measuring values, includes:

determining a K plane for each radiation source position and each location to be reconstructed in the examination zone (Col. 7, lines 5-11 and Step 20);

determining K lines, wherein K lines include lines of intersection between the K planes and a detector surface of the radiation sensitive detector (Col. 7, lines 5-11 and Step 20);

multiplying the partial derivative of the measuring values on each K line by a weighting factor that corresponds to a reciprocal value of a sine of a K angle (Steps 43-44); and

integrating the partial derivative of the measuring values along the K lines (Equations 10, 12-13 and 16).

Note: K plane corresponds to Π plane. K lines correspond to family of lines.

With respect to claim 11, Katsevich further teaches prior to the reconstruction step, multiplying the integrated partial derivative by the same weighting factor (Equations 12-13, distance weighting factor outside of integral of partial derivative).

With respect to claim 15, Katsevich teaches a method, comprising:

identifying a first voxel from a plurality of voxels within an examination zone to reconstruct (Step 51 where x is voxel in 3D reconstruction); and

reconstructing the first voxel as a function of a first set of corresponding projection angles indicative of angles at which a radiation beam traverses the first voxel (Step 50 and Figure 2).

With respect to claim 16, Katsevich further teaches further including reconstructing at least a second voxel (Step 58), from the plurality of voxels, as a function of a second set of corresponding projection angles indicative of angles at which the radiation beam traverses the second voxel (Step 50 and Figure 2).

With respect to claim 17, Katsevich teaches a system, comprising:

a detector that detects radiation from a conical radiation beam traversing an examination zone and that generates measuring values indicative of the detected radiation (Col. 4, lines 3-13 and Figure 1); and

a reconstructor (4) that integrates the measuring values over projection angles corresponding to angles enclosed by a PI line (Col. 5, lines 36-44 and Figure 4) of an object point (x) projected in a plane perpendicular to an axis of rotation (Equation 1 for y_1 and y_2).

With respect to claim 18, Katsevich further teaches wherein the reconstructor

determines a partial derivative (Step 35) of measuring values ($D_f(y,\Theta)$),

performs a weighted (distance weighting $1/|x-y(s)|$) integration of the partial derivative (Equation 10), and

integrates the weighted-integration of the partial derivative of the measuring values (Equation 10).

With respect to claim 19, Katsevich further teaches wherein the weighted integration, includes:

determining a K plane for each radiation source position and each location to be reconstructed in the examination zone (Col. 7, lines 5-11 and Step 20);

determining lines of intersection between the K planes and a detector surface of the detector, wherein the lines of intersection are K lines (Col. 7, lines 5-11 and Step 20);

multiplying the partial derivative of the measuring values on each line of intersection by a weighting factor that corresponds to a reciprocal value of a sine of a K angle (Steps 43-44); and

integrating the partial derivative of the measuring values along the lines of intersection (Equations 10, 12-13 and 16).

Note: K plane corresponds to Π plane. K lines correspond to family of lines.

With respect to claim 20, Katsevich further teaches wherein the reconstructor back projects (Step 50) the measuring values using an exact (Col. 2, lines 24-42) 3D (Col. 1, lines 5-7) back projection technique.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turbell et al. in view of Katsevich and Zeng et al. (5,559,335).

With respect to claim 1, Turbell et al. teaches a computed tomography method (Title and Abstract) which comprises the steps of:

generating, using a radiation source, a conical radiation beam which traverses an examination zone or an object present therein (Figure 1),

generating a relative motion of the radiation source about the examination zone, which relative motion comprises a rotation about an axis of rotation and a displacement parallel to the axis of rotation and is shaped as a helix (Figure 1),

acquiring measuring values which are dependent on the intensity of the radiation beam that traverses the examination zone and is incident on of a detector unit during the relative motions (Figure 1), and

reconstructing a CT image of the examination zone from the measuring values (Figures 6-8), in which reconstruction of a back projection (Page 865, step 4 of introduction) comprising the following steps is carried out:

> determining measuring values of parallel rays with different radiation source positions in conformity with the angular position of the radiation source (Page 865, step 2 of introduction and Figure 1),
>
> multiplying the measuring values by a first weighting factor which corresponds to the cosine of the cone angle of the ray associated with the measuring values (Page 865, step 1 of introduction), and
>
> reconstructing the absorption of each object point by back projection of the weighted measuring values (Page 865, step 4 of introduction).

Turbell fails to teach

an exact 3D backprojection,

determining the partial derivative of measuring values,

performing an integration of the partial derivative of the measuring values along K lines.

Turbell et al. fails to explicitly teach multiplying the measuring values by a second weighting factor which corresponds to the reciprocal value of the cosine of a fan angle of the beam associated with the measuring values.

Katsevich teaches

an exact (Col. 2, line 27) 3D (Col. 1, lines 6-7) backprojection (Col. 2, lines 31-33),

determining the partial derivative (Step 35) of measuring values ($D_f(y,\Theta)$),

performing an integration of the partial derivative (Equation 10) of the measuring values along K lines (Col. 7, lines 5-11).

Note: K plane corresponds to Π plane. K lines correspond to family of lines.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Turbell et al. to include the partial derivative of Katsevich, since a person would have been motivated to make such a modification to produce exact images with reduced scanning times (Col. 2, lines 24-46) as taught by Katsevich.

Zeng et al. teaches multiplying the measuring values by a second weighting factor which corresponds to the reciprocal value of the cosine of a fan angle of the beam associated with the measuring values (Col. 4, lines 45-46 and 52-56).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Turbell et al. as modified above the 1/cos (fan angle) weighting of Zeng et al., since a person would have been motivated to make such a modification to reduce reconstruction times (Col. 3, lines 2-10) as taught by Zeng et al.

With respect to claim 2, Turbell et al. further teaches the reconstruction step further includes rebinning of the weighted, integrated partial derivative of the measuring values is performed prior to the back projection so as to form a number of groups, each group comprising a plurality of planes which extend parallel to one another and to the axis of rotation and in which a respective fan beam is situated (Figure 1).

With respect to claim 3, Turbell et al. teaches a computed tomography method (Title and Abstract) which comprises the steps of:

generating a radiation source, a conical radiation beam which traverses an examination zone or an object present therein (Figure 1);

generating a relative motion of the radiation source about the examination zone, which relative motion comprises a rotation about an axis of rotation and a displacement parallel to the axis of rotation and is shaped as a helix (Figure 1);

acquiring measuring values which are dependent on the intensity of the radiation beam that traverses the examination zone and is incident on a detector unit during the relative motions (Figure 1); and

reconstructing a CT image of the examination zone from the measuring values (Figure 6-8), in which reconstruction of a back projection (Page 865, step 4 of introduction) comprising the following steps is carried out:

determining measuring values of parallel rays with different radiation source positions in conformity with the angular position of the radiation source (Page 865, step 2 of introduction and Figure 1);

multiplying the measuring values by a first weighting factor which corresponds to the cosine of the cone angle of the ray associated with the measuring values (Page 865, step 2 of introduction and Figure 1).

Turbell et al. fails to teach

an exact 3D back projection,

determining the partial derivative of measuring values;

performing an integration of the partial derivative of the measuring values along K lines; and

reconstructing the absorption of each object point by back projection of the integrated partial derivative of the measuring values, wherein the integration of the measuring values along the K lines comprises the following steps:

determining the partial derivative of measuring values;

determining a K plane for each radiation source position and each location to be reconstructed in the examination zone;

determining the K lines, wherein the K lines are lines of intersection between the K planes and a detector surface of the detector unit;

multiplying the partial derivative of the measuring values on each K line by a weighting factor which corresponds to the reciprocal value of the sine of a K angle; and

integrating the partial derivative of the measuring values along the K lines.

Turbell et al. further fails to teach multiplying the measured values by a second weighting factor which corresponds to the reciprocal value of the cosine of a fan angle of the beam associated with the measuring values

Katsevich teaches

an exact (Col. 2, line 27) 3D (Col. 1, lines 6-7) backprojection (Col. 2, lines 31-33);

determining the partial derivative (Step 35) of measuring values ($D_f(y,\Theta)$);

performing an integration of the partial derivative (Equation 10) of the measuring values along K lines (Col. 7, lines 5-11); and

reconstructing the absorption of each object point by back projection of the integrated partial derivative of the measuring values (Step 50), wherein the integration of the measuring values along the K lines comprises the following steps:

determining the partial derivative of measuring values (Step 35);

determining a K plane for each radiation source position and each location to be reconstructed in the examination zone (Col. 7, lines 3-11);

determining the K lines, wherein the K lines are lines of intersection between the K planes and a detector surface of the detector unit (Steps 53-55);

multiplying the partial derivative of the measuring values on each K line by a weighting factor which corresponds to the reciprocal value of the sine of a K angle (steps 43-44); and

integrating the partial derivative of the measuring values along the K lines (Equations 10, 12-13 and 16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Turbell et al. to include the partial derivative of Katsevich, since a person would have been motivated to make such a modification to produce exact images with reduced scanning times (Col. 2, lines 24-46) as taught by Katsevich.

Note: K plane corresponds to Π plane. K lines correspond to family of lines.

Zeng et al. teaches multiplying the measuring values by a second weighting factor which corresponds to the reciprocal value of the cosine of a fan angle of the beam associated with the measuring values (Col. 4, lines 45-46 and 52-56).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Turbell et al. as modified above the 1/cos (fan angle) weighting of Zeng et al., since a person would have been motivated to make such a modification to reduce reconstruction times (Col. 3, lines 2-10) as taught by Zeng et al.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Danielsson et al. (DE 199 44 701 A1. Note: The Applicant is referred to US 6,778,629 for English translation.) in view of Katsevich and Zeng et al.

With respect to claim 4, Danielsson et al. teaches a computer tomograph (Figure 1) comprising:

a radiation source (S) and a diaphragm arrangement (3) which is situated between the examination zone and the radiation source (Figure 1) in order to generate a radiation beam (4) which traverses an examination zone or an object present therein (13),

a detector unit (16) which is coupled to the radiation source (Figure 1),

a drive arrangement (2 and 5) which serves to displace an object present in the examination zone and the radiation source relative to one another about an axis of rotation and/or parallel to the axis of rotation (14),

a reconstruction unit (10) configured to reconstruct the spatial distribution of the absorption within the examination zone from measuring values acquired by the detector unit (Page 3, lines 24-25),

a control unit (7) configured to control the radiation source, the detector unit, the drive arrangement and the reconstruction unit (Page 3, lines 24-28) in conformity with the steps of

determining measuring values of parallel rays with different radiation source positions in conformity with the angular position of the radiation source (Step 101 and Figure 3),

multiplying the measuring values by a first weighting factor which corresponds to the cosine of the cone angle of the ray associated with the measuring values (Step 102), and

reconstructing the absorption of each object point by back projection of the measuring values (Step 106).

Danielsson et al. fails to teach

determining the partial derivative of measuring values, and

performing a weighted-integration of the derived measuring values along K lines.

Danielsson et al. further fails to explicitly teach multiplying the measuring values by a second weighting factor which corresponds to the reciprocal value of the cosine of a fan angle of the beam associated with the measuring values.

Katsevich teaches

determining the partial derivative (Step 35) of measuring values ($D_f(y,\Theta)$), and

performing an integration of the partial derivative (Equation 10) of the measuring values along K lines (Col. 7, lines 5-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Danielsson et al. to include the partial derivative of Katsevich, since a person would have been motivated to make such a modification to produce exact images with reduced scanning times (Col. 2, lines 24-46) as taught by Katsevich.

Note: K plane corresponds to Π plane. K lines correspond to family of lines.

Zeng et al. teaches multiplying the measuring values by a second weighting factor which corresponds to the reciprocal value of the cosine of a fan angle of the beam associated with the measuring values (Col. 4, lines 45-46 and 52-56).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Turbell et al. as modified above the 1/cos (fan angle) weighting of Zeng et al., since a person would have been motivated to make such a modification to reduce reconstruction times (Col. 3, lines 2-10) as taught by Zeng et al.

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turbell et al. in view of Katsevich and Zeng et al. as applied to claim 1 above, and further in view of Hsieh (6,529,575).

With respect to claim 5, Turbell as modified above suggests the method as recited above. Turbell et al. as modified above fails to explicitly teach a diaphragm arrangement. Turbell et al. as modified above further fails to explicitly teach a computer-readable medium encoded with a computer program for a control unit for controlling a radiation source, a diaphragm arrangement, a detector unit, a drive arrangement and a reconstruction unit of a computer tomograph so as to execute steps.

Hsieh teaches a diaphragm arrangement (Col. 3, lines 63-66).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Turbell et al. as modified above the diaphragm arrangement of Hsieh, since a person would have been motivated to make such a modification to minimize patient dose by limiting the x-ray beam to the size of the detector (Col. 3, line 65 – Col. 4, line 5) as implied by Hsieh.

Hsieh teaches a computer-readable medium encoded with a computer program for a control unit for controlling a radiation source, a diaphragm arrangement, a detector unit, a drive arrangement and a reconstruction unit of a computer tomograph so as to execute steps (Col. 8, line 57 - Col. 9, line 12).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Turbell et al. as modified the computer-readable medium of Hsieh, since person would have been motivated to make such a modification to more easily update existing systems to implement the invention (Col. 8, line 66 - Col. 9, line 1) as taught by Hsieh.

11. Claims 7-11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turbell et al. as applied to claim 6 above, and further in view of Katsevich.

With respect to claims 7 and 8, Turbell et al. discloses the method as recited above. Turbell et al. fails to teach

wherein a projection angle is the angle enclosed by a PI line of an object point projected in a plane perpendicular to an axis of rotation;

determining a partial derivative of the measuring values;

performing a weighted-integration of the partial derivative; and

reconstructing the integrated partial derivative to generate the image.

Katsevich teaches wherein a projection angle (parameter s) is the angle enclosed by a PI line (Col. 5, lines 36-44 and Figure 4) of an object point (x) projected in a plane perpendicular to an axis of rotation (Equation 1 for y_1 and y_2);

determining a partial derivative (Step 35) of the measuring values;

performing a weighted-integration of the partial derivative (Equations 10 and 12, $1/\sin\gamma$ term and equation 10, $1/|x-y(s)|$ term); and

reconstructing the integrated partial derivative to generate the image (Step 50 and items 4 and 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Turbell et al. to include the features of Katsevich, since a person would have been motivated to make such a modification to produce exact images with reduced scanning times (Col. 2, lines 24-46) as taught by Katsevich.

With respect to claim 9, Katsevich further teaches wherein the partial derivative is integrated (Equation 10) along K lines (Col. 7. lines 5-11).

Note: K plane corresponds to Π plane. K lines correspond to family of lines.

With respect to claim 10, Katsevich further teaches wherein performing the weighted-integrating the partial derivative of the measuring values, includes:

determining a K plane for each radiation source position and each location to be reconstructed in the examination zone (Col. 7, lines 5-11 and Step 20);

determining K lines, wherein K lines include lines of intersection between the K planes and a detector surface of the radiation sensitive detector (Col. 7, lines 5-11 and Step 20);

multiplying the partial derivative of the measuring values on each K line by a weighting factor that corresponds to a reciprocal value of a sine of a K angle (Steps 43-44); and

integrating the partial derivative of the measuring values along the K lines (Equations 10, 12-13 and 16).

Note: K plane corresponds to Π plane. K lines correspond to family of lines.

With respect to claim 11, Katsevich further teaches prior to the reconstruction step, multiplying the integrated partial derivative by the same weighting factor (Equations 12-13, distance weighting factor outside of integral of partial derivative).

With respect to claim 14, Katsevich further teaches

$$-\frac{1}{2\pi^2}\int_0^\pi d\varphi p(y(s(\varphi)),\Phi(s(\varphi),x)) \text{(Equation 12).}$$

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turbell et al. in view of Katsevich as applied to claim 8 above, and further in view of Zeng et al.

With respect to claim 12, Turbell et al. as modified above suggests the method as recited above. Turbell et al. further teaches prior to the reconstruction step: multiplying the measuring values by the cosine of a cone angle of the radiation beam (Page 865, step 1 of introduction).

Turbell et al. as modified above fails to explicitly teach dividing the measuring values by the cosine of a fan angle of the radiation beam.

Zeng et al. teaches dividing the measuring values by the cosine of a fan angle of the radiation beam (Col. 4, lines 45-46 and 52-56).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Turbell et al. as modified above the dividing of Zeng et al., since a person would have been motivated to make such a modification to reduce reconstruction times (Col. 3, lines 2-10) as taught by Zeng et al.

13. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turbell et al. as applied to claim 6 above, and further in view of in view of Katsevich and Zeng et al.

With respect to claim 13, Turbell et al. discloses the method as recited above. Turbell et al. further teaches cos λ weighting (Page 865, step 1 of introduction). Turbell et al. fails to explicitly teach 1/Rcos ε weighting. Turbell et al. further fails to teach a weighted integration of a partial derivative of the measuring values and integration over projection angles.

Katsevich teaches a weighted integration of a partial derivative of the measuring values and 1/R (Equations 12 and 13) and integration over projection angles (over s).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Turbell et al. to include the features of Katsevich, since a person would have been motivated to make such a modification to produce exact images with reduced scanning times (Col. 2, lines 24-46) as taught by Katsevich.

Zeng et al. teaches 1/cos ε weighting (Col. 4, lines 45-46 and 52-56).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Turbell et al. as modified above the weighting of Zeng et al., since a person would have been motivated to make such a modification to reduce reconstruction times (Col. 3, lines 2-10) as taught by Zeng et al.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Weng et al. (US 5,404,293) discloses a method of performing helical cone beam reconstruction using rebinning in a SPECT system (Abstract).

Proksa et al. (US 6,285,733) discloses a cone beam rebinning technique (Abstract and Figures 3-5).

Shimoni et al. (US 4,570,224) discloses lateral spacing of rebinned data following a 1/ cos (fan angle) lateral spacing that differs from that of the original data (Col. 3, lines 17-25 and Figure 5).

Turbell ("Cone-Beam Reconstruction Using Filtered Backprojection", February 2001, Linkoping Studies in Science and Technology Dissertation No. 672, ISBN 91-7219-919-9) discloses circular and helical reconstruction method using parallel rebinning techniques (chapters 3 and 4).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John M. Corbett whose telephone number is (571) 272-8284. The examiner can normally be reached on M-F 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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